

STATUS REPORT: *Informing Emergency and Risk Management Climate Knowledge in Arid Regions* – Status Report

NOAA's Climate Program Office's SARP program awarded Arizona State University's proposal titled "*Informing Emergency and Risk Management Climate Knowledge in Arid Regions*" in 2014. The Project has principal investigator(s) Nalini Chhetri (Arizona State University), Anthony Cox (Arizona Dept. of Emergency & Military Affairs); Nancy Selover (ASU), Kenneth Galluppi (ASU); and Research Associate Hana Putnam (ASU).

Goals and objectives of project

The two goals of the project are to 1) understand how local and regional emergency management communities function so that climate science knowledge can be effectively infused into their decision processes, and 2) develop a framework for identifying products and services that can deliver needed knowledge about climate extremes, threats, impacts, and resulting risk in order to prioritize mitigation and adaptation efforts. From the goals, the following objectives were derived: i) define who the EM community is, how they function and how they make risk management decisions related to climate extreme events; ii) identify the decision frameworks and processes that this community currently uses and any gaps that may exist; iii) determine if they use climate information now, how they get their information, what is missing and what information may improve their decision making processes; iv) explore the most critical issues that impair effective decision-making processes. These were designed to develop an understanding of the existing products and services being utilized by the risk and emergency communities in arid regions, and to provide insight into new products or services, which might be more effective primarily in extreme weather events.

Given the delay in the start of the project, and movement of the original cast of PIs in the project within the university system, the project started implementation only in late 2014. As it picked up steam, we utilized a suite of methodological protocols including in-depth interviews, participation in mitigation meetings and trainings, a workshop with the larger EM community and an analytical *WxEM* framework. The *WxEM* framework aims to build an understanding of how the Emergency Management and Risk Management communities, including government and the private sector, use extreme weather knowledge to inform and prioritize mitigation decisions. The analysis is a cyclical process which involves getting a *baseline* reading of who makes up the community, understanding *current practices* of that community, creating a prototype based on the communities needs, and validating the prototype as it relates to the community.

Progress made so far

Baseline

Identification of key community members: These members were a) risk managers, and those who worked in b) emergency management-preparedness and response, c) emergency management-mitigation, and d) emergency support functions. The team identified, consulted and conducted in-depth interviews of key risk and emergency managers, in addition to those working

in some emergency support functions (ESFs) in Maricopa and Coconino County. To date we have completed 41 in-depth interviews. Each interview has been documented through an iterative process.

The first public presentation of these findings was presented at the January American Meteorological Society Annual conference held in the City of Phoenix in January 2015. The title of the presentation was *Informing Emergency and Risk Management with Climate Knowledge in Arid Urban Areas*. NOAA personnel attended the presentation.

The team participated in six hazard mitigation sessions lead by Arizona's state planning team in order to understand how those concentrated on mitigation within emergency management were thinking about long-term planning as it relates to extreme weather and long-term changes in the climate. Additionally, our team participated in mitigation meetings in Coconino and Maricopa Counties. Working alongside and interacting with these communities allowed us to identify who the key stakeholders were in addition to what their priorities were and how they currently used weather and climate information.

Analysis of Existing Climate Information/Tools & Identification of Stakeholders within NOAA

The team has sought out existing climate information and how accessible it is to its users. This has been accomplished through researching various tools available to the public in addition to interviews with NOAA personnel. Furthermore, the team is continuing to pursue how this project could best inform NOAA and which NOAA group(s) would benefit from our results. Attendance at the Climate Prediction Applications Science Workshop meeting in New Mexico at which we met with NOAA Climate Services staff was critical to enhancing this step in our research. Team members have also consulted with several NOAA personnel to identify key contact persons in NOAA who would see value in the findings of the project.

Current Practices

Climate Resiliency Toolkit

Our team is in the process of preparing a position paper on the NOAA Climate Resilience Toolkit, which is the current product NOAA has to provide information on risks associated with climate change. In general, the Climate Resilience Toolkit is a clearinghouse for tools that can assist decision-makers (including farmers, water resource managers, coastal communities, utilities, and government agencies and businesses) in preparing for near-term, seasonal and long-term changes in weather. They include case studies of specific applications of climate information in decision making in a wide variety of contexts. However, the toolkit contains no forecast, prediction or climate guidance for extreme weather events related to climate change within the 2 to 10 year time interval. Our preliminary findings, stemming from interviews and the workshop our team organized reveal that this is the time period of interest to risk management and planners as it covers the FEMA Hazard Mitigation Plan update time periods, as well as the budget horizons of city and county agencies.

Workshop

After a preliminary analysis of the state of weather-related emergency preparedness of Coconino and Maricopa County in the state of Arizona, the City of Flagstaff and Coconino County was found to be ahead of others as it had completed its Resilience and Preparedness Plan with a wide range of stakeholders in 2012. For this reason, the team decided to collaborate with the City of Flagstaff and Coconino county department of emergency management to conduct a half-day workshop on May 12th, 2015 to see what the next step would be on this preparedness plan. The title of the workshop was, “*Planning for Losses and Impacts Resulting From Changes in Extreme Weather Patterns*”. The desired outputs of the workshop were to:



- Articulate the meaning of weather-related loss for different stakeholders including an understanding of the scale, magnitude and categories of how such losses inform actionable decision-making
- Explore an initial look at a cascade of potential impacts to the local community from an array of weather scenarios
- Articulate recommendations to NOAA regarding prioritized information for assistance in long-term planning as it relates to loss from changing extreme weather events.

Our general findings from the workshop were:

- Half of the participants were in agreement that the consequences of extreme weather events in Flagstaff are not perceived to be a priority. The other half of the group counted insufficient knowledge as the greatest barrier to planning.
- The group was comprised of mostly people who saw themselves as “the decision-maker” of their organization or “an advisor to the decision-maker” of their organization.
- This group defined “extreme” weather events in terms of impacts on their community, more specifically, the majority of the group seemed to define impacts in terms of effects on people (as opposed to effects on infrastructure or dollars).
- The time frame of climate information this group would like would be 1, 2, 5, & 10 years into the future. 1,2, &5 years were agreed upon unanimously with one person who said they would need 10 years.
- Participants want updates to previous information that they’ve been given (e.g. information given on 2 years out would be updated the following year to be more accurate).
- Participants want region-specific information.

Next Steps:

The main goal of our next steps will be focused on the mitigation process. This process is well equipped to deliver feasible future planning provided it is carried out correctly. The current

status of this process is not conducive to creating plans that will reduce the long-term cost that extreme weather events have on lives and property. Steps taken to correct this should include:

- Alerting FEMA that the process is flawed through institutional and informal channels.
- Alerting NOAA that those working in local-regional emergency management need actionable climate information to use during the mitigation process
- Creating an open-stream of communication between the two agencies.
- Preparation of manuscripts for abstract submission for conferences and high impact outlets.